



EPA Region 7 TMDL Review

TMDL ID 364 Water Body ID 19, 21

Water Body Name Owl Creek

Pollutant Copper

Tributary Bloody Run 25; Cherry Creek 20; Plum Creek 22; South Owl Creek 552

State KS HUC 11070201

Basin Neosho

Submittal Date 01/13/2005

Approved yes

Submittal Letter

State submittal letter indicates final TMDL(s) for specific pollutant(s)/ water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act.

Letter received by EPA January 13, 2005, formally submitting this TMDL for approval under Section 303(d).

Water Quality Standards Attainment

The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.

The loading capacity is defined by the numeric water quality criterion for copper which is hardness-dependent. The endpoint is for total copper concentrations to remain below the acute and chronic copper criteria at all flows. The TMDL was developed using the acute and chronic WQS copper criteria derived from the flow-hardness regression equation; an 86 percent reduction in acute copper loading, and a 91 percent reduction in chronic copper loading, should result in water quality standards (WQS) attainment and achievement of the expected aquatic life use.

Numeric Target(s)

Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

The TMDL describes all applicable WQS and the beneficial uses; the impaired use is the expected aquatic life use. The target is the water quality criteria for acute and chronic copper toxicity.

Link Between Numeric Target(s) and Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.

The target is the water quality criterion for acute and chronic copper toxicity; the link between the target and the criteria is hardness-dependent. A regression equation was developed to describe the inverse proportionality of hardness to flow, which was found to be statistically significant; the equation was used to define hardness at any particular flow regime, within the range of 72-161 mg/L CaCO₃. This allowed for derivation of "interim" WQS values for copper within individual flow exceedance ranges and used to estimate TMDL loads within each of these ranges. The average of these TMDL estimates across all flow ranges was used as the TMDL for the watershed.

The Generalized Watershed Loading Function (GWLF) model was used to calculate the watershed yield for sediment, and copper concentrations in soils were derived from several USGS studies in Kansas. The source assessment determined copper was a non-point source pollutant load in the watershed, therefore, the anticipated average load allocation (LA) reduction was calculated by subtracting the LA from the GWLF non-point loading estimate.

The load duration curve was used to calculate the TMDL in general because it relies on measured water quality data and paired water hardness data, and a wide range of "flow exceedance" data representing a complete range of flows anticipated in Owl Creek. In calculating the TMDL the average condition was considered across the seasons to establish goals of the endpoint and desired reductions. Therefore, the target average copper level was multiplied by the average daily flow for Owl Creek across all hydrologic conditions which is represented graphically by the integrated area under the copper load duration curve.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.

Land use and sources in the watershed are described. Several studies were evaluated for potential copper sources such as automobile brake deposits, building materials, and copper-based pesticides and feed or fertilizers. Due to the low density of humans populations in the watershed, agricultural land uses involving copper are suspected as the significant contributors. All significant sources are discussed.

Allocation

Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.

The allocation of wasteloads (WLAs) and load allocations (LAs) are made in terms of total copper reductions. Allocations relate to the average copper levels seen in Owl Creek at station 610 for the critical higher flow conditions. The average loading capacity is identified as 1.483 pounds/day for acute toxicity and 0.978 pounds/day for chronic toxicity. The area under the load duration curve is segregated into allocated areas assigned to point sources (WLA) and non-point sources (LA).

WLA Comment

The WLA is 0.075 pounds/day total copper for acute toxicity and 0.48 pounds/day for chronic toxicity; no reduction is necessary because the design flow of the facility equals the lowest flows seen at station 610 and the WLA equals the TMDL curve with a margin of safety across this flow condition.

LA Comment

The LA is an average 1.259 pounds/day total copper for acute toxicity, and 86% reduction, and 0.832 pounds/day for chronic toxicity; a 91% reduction.

Margin of Safety

Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.

The margin of safety is explicitly set at 10 percent of the loading capacity, or 0.148 pounds/day total copper for acute toxicity, and 0.098 pounds/day for chronic toxicity.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).

Seasonal variation and critical conditions are considered in the use of the load duration curve methodology which accounts for loads at all flow conditions.

Public Participation

Submittal describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).

Public meetings to discuss TMDLs in the Neosho Basin were held January 9, 2002, in Burlington, March 4, 2002, in Council Grove, and July 30, 2004, in Marion. Public hearings were held in Burlington and Parsons on June 3, 2002. The Neosho Basin Advisory Committee met to discuss the TMDLs in the basin on October 2, 2001, January 9, March 4, and June 3, 2002. The TMDL was public noticed on the KDHE TMDL website: <http://www.kdhe.state.ks.us/TMDL>.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).

KDHE will continue to collect bimonthly samples at rotational Station 610 in 2004 and 2008 including total copper samples. More intensive sampling may be conducted if monitoring indicates continued impaired status. Use of USEPA Method 1669 - Sampling Ambient Water for Trace Metals at USEPA Water Quality Criteria Levels for ultra-clean copper sampling and analysis could help to further define potentially bioavailable and toxic forms of copper in the subwatershed. Use of the real-time flow data available at the Marmaton River near Marmaton stream gaging station can also help direct sampling efforts.

Reasonable assurance

Reasonable assurance only applies when reduction in nonpoint source loading is required to meet the prescribed waste load allocations.

Reasonable assurance, although not necessary for this TMDL since the point source contribution is inconsequential, includes numerous authorities and funding through the Kansas Water Plan.
